The Maryland Fruit Grower

June, 1935

Maryland State
Horticultural Society

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Published Monthly by the Maryland State Horticultural Society

Edited by the Secretary, A. F. Vierheller, Extension Horticulturist

Vol. 5 **June, 1935** **No. 6**

WILL GIRDLING KILL AN APPLE TREE?

By A. L. Schrader, Pomologist,
University of Maryland

Apple growers are familiar with the ill effects resulting from the girdling of apple trees by mice. Trees completely girdled by mice die within a season unless the grower resorts to bridge-grafting or inarching to re-establish a bark connection. Failure to bridge over the gap in the bark of the tree apparently is followed by the starvation of the roots since the materials manufactured by the leaves no longer can be transported to the roots through the bark tissue.

With the bad example of the mice injury to confront us, it seems foolish to consider girdling or ringing as a commercial practice to aid in promoting the fruitfulness of the tree. However, it has been demonstrated many times in the centuries past that a narrow ring of bark removed during the forepart of the season *will not* often result in the death of the tree since the bark will grow sufficiently to reunite across the narrow gap during the same season in contrast with the lack of such reunion across the wide gap caused by mice. Moreover, the temporary severing of bark connection has resulted in accumulation of materials in the tree parts above the ring and *abundant fruit bud formation.* The effect on fruit bud formation appears as a great commercial possibility, but another effect has always been pointed out as a big objection, namely, the usually serious effect on the growth of the tree. However, in recent years actual experimental records of trees under commercial conditions tend to show that the effects on the growth of the tree may not be of great consequence except under certain conditions and therefore, ringing or girdling may have a place in the orchard program. Bringing filler trees into early bearing has been a problem which some investigators think can be solved by the practice of ringing. Fagan (1) in Pennsylvania, working with Stayman Winesap, McIntosh, Rome Beauty and Baldwin since 1922 has obtained some very favorable results from ringing early in June. Eight-year-old Stayman and McIntosh trees responded with a yield in the following season of four bushels per tree in contrast with one bushel for the unringed trees. Rome and Baldwin also gave increased yields with ringing. A few weak trees of Rome and Baldwin on thin soil on a ridge in the orchard died in the following season but the remainder of the trees suffered little in growth as a result of ringing. In the course of the work since 1922, Fagan has decided that a knife-cut through the bark twice around the trunk of the tree is just as effective as removing a narrow strip of ¼ inch. He feels that when filler trees reach a size sufficient to produce three bushels per tree that ringing is desirable to make the trees produce and such ringing should be done between May 25 and June 15.

In Ohio, Howlett (2) also has advocated the ringing of filler trees but in somewhat different manner than Fagan in Pennsylvania. Howlett has shown by careful measurements that the ringing of one or two main limbs has increased fruitfulness of these limbs with practically no ill effects on

growth that can be attributed to the ringing. He advocates ringing only one or two limbs in a season, and thus take a few seasons to complete the work.

In vie wof the work in Pennsylvania and Ohio, it appears that ringing could profitably be used to bring young filler trees into bearing.

With regard to older trees, some work was initiated in Maryland by Schrader and Vierheller (3) in early June, 1934, on bearing trees of Delicious and Stayman Winesap. There was a marked increase in numbers of fruit buds formed and very little effect upon the growth of the tree. Some Delicious trees without a crop which had a narrow ring of bark removed showed earlier maturity of the leaves, as indicated by yellowing and dropping of the foliage. A delay of a day or two was noted in time of opening of the blossoms in the following spring, as was noted by Fagan (1). One main objective of the ringing work was to use it in conjunction with thinning of the fruits in an attempt to influence the biennial bearing habit of the trees in Maryland. The blossom results of 1935 indicate that moderate early June thinning plus ringing with a saw cut may accomplish the desired annual cropping but more data on these trees and others are essential to arrive at definite conclusions. From the data obtained on size of the fruit at harvest it was evident that ringing did not influence the size of the fruit.

Another objective of this thinning work was to make Delicious trees bear a more satisfactory crop since this variety in Maryland has shown a disposition to bear shyly and by limbs. The results of last year's ringing are promising, especially considering the relative lack of injury to the trees.

In conclusion, let us consider the possibility of ringing for our young filler trees or other young trees that are slow in coming into bearing and hope that we also may adapt it to bearing trees to get annual crops. However, do not ring bearing trees until we have the complete story as to its effects and defects. Any ringing should not remove a strip of bark, but should be only a knife cut, or possible a saw cut as the latter is easier to perform, although offering a place for codling moth to spin cocoons.

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1. *Fagan, F. N.* The management of filler apple trees by ringing and severe heading back. Proc. Amer. Soc. Hort. Sci. *25*: 229-231. 1928.

2. *Howlett, F. S.* Has ringing any place in commercial orchard practice. Proc. Amer. Soc. Hort. Sci. 22: 22-28. 1935.

3. Schrader, A. L. and A. F. Vierheller. Md. Agric. Exp. Sta. (Unpublished data.)

FRUIT PROSPECTS

From written reports and personal observations, Maryland's crop prospects on June 7, appeared rather favorable, with the possible average none too heavy. It is rather difficult to determine the variety prospects, due to differences of set of varieties in various orchards or sections.

Apples:—Western Maryland reported a good prospect; probably 70 per cent, but apparent light to medium set on York, Jonathan and Delicious. Aphis and curculio seemed scarce, and a few codling moths were emerging in late May, but no eggs had hatched on June 5. Peak of emergence of moths was expected about the second week in June, with egg-laying, following early, if weather was warm.

Frederick and Carroll Counties had about 50 to 60 per cent crop prospect.

Cecil and Harford Counties expected about a 70 per cent crop. Some orchards had early blooming varieties such as Gravenstein and Smokehouse setting heavy, while Grimes, Stayman, Winesap and Delicious were light, and York, Wealthy, Jonathan, Paragon and Golden Delicious setting fair to good.

Baltimore and Howard Counties had about 40 to 60 per cent set, York and Baldwin being heavy, Delicious and Black Twig about normal (little thinning needed) and light sets on Rome, Jonathan, Winesap and Grimes.

Montgomery orchards were spotty, but some orchards had normal crop prospects.

Southern Maryland growers reported satisfactory crops of Delicious and Stayman, though not heavy.

Eastern Shore seemed rather well set for a good crop. Grimes and Transparent were heavy in some orchards, and Delicious, Stayman and Jonathan seemed to have a medium crop prospect.

Scab was very serious in some sections. Blight did some damage to spurs, and cedar rust was showing in a few orchards.

The general bloom was the heaviest since 1926, but pollination season was unfavorable in many orchards.

As a rough summary, it appears that the apple crop in Maryland may be about the same as that of last year, or possibly slightly above, though this may be over-estimated.

Peaches:—Western Maryland expected about a 60 per cent crop. The rest of the Western Shore has occasional orchards with varying crops from 0 to 90 per cent, but the total crop will be rather light for the section. There are practically no peaches on the Shore, north of Salisbury and Berlin, where good crops are expected. In general, the yellow peaches were severely injured in the bud by the winter freezes. Possibly a 40 to 50 per cent crop may be expected for the State.

Peaches were in excellent and clean condition where there was a crop set. The drop appeared to be very heavy, and leaf curl was serious in some orchards.

Pennsylvania expects a full apple crop in the northern section, and a lighter crop than 1934 in the southern section, with Stayman light and York a half crop.

New Jersey looks for 10 to 15 per cent more apples than the 1934 crop. Rome, Williams, Wealthy and Gravenstein set heavy, generally, with Stayman, Delicious and Winesap light. Central and North Jersey have the best crop prospects. The peach crop is about 20-25 per cent normal.

Virginia reported light set of Yorks, Delicious and Grimes, with Stayman, Black Twig and Winesap a little better. They expect a crop about like that of 1934. Peaches were frozen out in several sections, so that last year's crop will not be exceeded.

CAUSING OF APPLE DROPPING

Dr. A. Murneek of Missouri Agricultural Experiment Station in speaking before the Nebraska State Horticultural Society, stated:

"The apple tree that is very often white with flower in the spring will have very few of these flowers really become fruit in the fall. If we have a set of 5% or sometimes 3%, we have a very good crop. Roughly, you know also that there are two drops, an early drop, and then what we call

the June drop. The early drop is caused by lack of pollination, and the June drop is caused by some disturbance.

"We believed that at one time. Then we started to investigate more carefully and we found that there are at least 4 drops. I will discuss and suggest some possible causes.

"The first drop occurs, (at least it has in Missouri, for the past 4 years) about a week to 12 days after flowering. Now that drop usually consists of very small aborted flowers. The fruit has not swollen at all. This is by far the largest drop. This first drop is caused by three things, as much as we know at present. It may be caused by other things, but this is at least as much as we know at present. In the first place, many of these flowers are abnormal. They look very much like the normal flower but if you examine them you will find them abnormal. They are incapable of being fertilized and forming fruits. They drop off due to lack of pollination, thousands and thousands of flowers on each apple tree.

"Bad weather in some years causes many of the normal flowers to drop.

"Third, these flowers have been self-pollinated, by the pollen of the same variety and therefore they do not stick to the tree. The first drop is by far the largest drop. All the drops together in most cases do not amount to 20% as compared to this first drop. These flowers drop on the ground and disintegrate promptly and you do not notice them as much as the June drop. Sometimes one variety will drop 95% of its flowers, or fruits if you wish, in this first drop.

"The second drop occurs about 12 days or 2 weeks after the first drop. Probably a part of the fruit in the base of the flower has already enlarged. It is often a very large drop. We do not know the exact cause of this drop though most likely it is due to self-pollination. It is also likely that many of these have been cross-pollinated, but because the nutrition is poor drop off, due to the fact that the tree is in a weakened condition, short of nitrogen; also due to a shortage of carbohydrates which are necessary for fruit formation. In either case, you may have the second dropping.

"The third drop occurs 12 to 14 days after the second one. The fruit has already rounded out, looks more or less like an apple. The calyx has closed. These drops are also quite large in some varieties and may be fairly heavy but never nearly as heavy as the second, which many call the June drop.

"The fourth drop occurs 10 to 14 days after the third drop. It is very often small—sometimes large. We have still other drops caused by other things but these I am talking about are the drops of immature apples.

"The summer apples such as the Wealthy, Duchess and others, as a rule drop their apples late during the third or fourth drop. They have relatively little first or second drop.

"Grimes, and Jonathan have a very uniform, fairly high first and second drop, and sometimes a third and fourth drop. The third is quite prominent in these varieties.

"The Jonathan and Ben Davis may have four drops, particularly the Ben Davis. The Jonathan probably has only two prominent drops, but the Ben Davis usually has three and sometimes four.

"Now these things, to our surprise, are hereditary. You can't do anything about it. You can't change this situation but you can change the relative number of fruits dropped at each time. Either apply nitrogen or insure

cross-pollination. Where better cross pollination is provided the second drop is much heavier than the first! The apples stick tighter and a little bit longer.

"From our studies we find that there is very little relationship between the June drop and the final set. We can affect the final set by the application of nitrogenous fertilizers but how this affects it we are not ready to say.

SPRAY RESIDUE

Occasionally, some statements are made in the newspapers that are not so good for the fruit and vegetable industry. In a Washington, D. C., paper, a recent article stated that "the careful inspectors of the Federal Food and Drug Administration continue to find shipments of fruit and vegetables which have on the surface, a residue beyond what is considered a safe limit. Among shipments seized were 137 of apples, 3 or pears and 14 of cauliflower. One shipment of imported sardines was destroyed because of the presence of lead in the food."

Evidently the spray residue question is important and needs to be considered seriously by growers, no matter what our personal opinions may be in the matter. There is a determined effort being made by certain forces to take the Food and Drug Administration from the U. S. Department of Agriculture, the argument being that the Department ofAgriculture leans toward the producer and favors the farmer. On the other hand the American Pomological Society is making strong effort to have the lead tolerance raised to 0.025 grains per pound of fruit. As the question now stands, the main effort should be toward keeping the residue tolerance from being lowered or even prohibited.

The 1935 residue tolerance has been announced. Both arsenic and fluorine tolerances are 0.01 grains per pound, as they were last year, however lead tolerance has been cut slightly. Last year we were allowed 0.019 grains per pound, but the 1935 allowance will be 0.018 grains of lead per pound of fruit.

For the benefit of those not informed, a letter from Mr. Henry A. Wallace, Secretary of Agriculture, dated January 24, 1935 is given:

"NOTICE TO PRODUCERS AND CONSUMERS OF APPLES AND PEARS:

"For many years the continued maintenance of the Nation's supply of apples and pears has been dependent upon the use of insecticides sufficiently effective to control the destructive ravages of insect pests which, if unchecked, would soon eliminate these practically indispensable foods with consequent impoverishment of the American dietary.

"In spite of continued efforts to develop a safe and at the same time effective substitute, lead arsenate is still essential to the production of these fruits. Until these efforts are successful, the employment of poisonous sprays on fruit must be followed by the adoption of precautions to guarantee reduction of the residue to the lowest possible figure. The overwhelming toxicological evidence against arsenic and lead imposes this obligation on the producer for the proper protection of the consumer.

The industry has demonstrated its ability to reduce the arsenic content to the world tolerance of 0.01 grain of arsenic trioxide per pound of fruit

and this tolerance will continue in effect. The fluorine tolerance will remain at 0.01 grain per pound of fruit. The reduction of unavoidable lead residue, to a point involving complete elimination of the most remote health hazard, continues to offer serious difficulties in spite of the utmost effort. The results of commercial cleaning operations on fruit before shipment during the 1934 season have demonstrated, however, that in general the 1934 tolerance of 0.019 grain of lead per pound has been successfully met without material damage to the fruit, and expectation of continued progress downward is fully justified. To grant the requests emanating from some quarters in the industry for a relaxation in the lead restriction would be wholly incompatible with public safety. The Department will therefore institute action under the Food and Drugs Act on apples and pears of the 1935 season's crop containing lead in excess of 0.018 grain per pound of fruit.

"Current public apprehension about the safety of the fruit supply from the standpoint of spray residue is very properly based on the unquestioned danger of poisons such as lead and arsenic. Consumers are entitled to know, however, that the restrictions imposed for many years against the shipment of fruit subjected to poisonous sprays have been so effective that unquestionably today most of the fruit offered the public is entirely safe. The effects of lead and arsenic in the amounts which might be present on sprayed fruit are chronic rather than acute in character. The relatively few instances in which fruit entering interstate traffic containing excessive residue escaped seizure under the Food and Drugs Act would not be sufficient of themselves to rank as significant health hazards. While Federal control does not extend to local traffic within the borders of a State, some States are supplementing Federal measures and are effecting comparable protection of their own citizens.

"Many consumers desiring to make assurance of safety doubly sure have sought advice as to measures that may be taken in the home of cleanse fruits such as apples and pears. Commercial cleaning methods generally involve the use of dilute acid or alkali solutions to loosen or dissolve the residue followed by rinsing in water. Such vigorous measures are unnecessary in the kitchen where attention can be given to each individual fruit. The usual sanitary practice in the home of scrubbing with water is desirable under any circumstance. Peeling the fruit or perhaps better, removal of stem and blossom ends where the residue is most difficult to reach is an added measure of safety which may be recommended."

Sincerely,

HENRY A. WALLACE, Secretary."

ZINC SULFATE SPRAY

In Maryland, peach growers are using zinc sulfate and lime sprays, both alone and in combination with sulfur sprays, and the results have been reported as satisfactory in control of the pruni disease, as well as in reduction of spray injury. Some growers report better color of foliage. In some orchards the zinc sulfate-lime spray is used in combination with lead arsenate, omitting sulfur in some of the summer sprays, sulfur being added to the last spray as a "carrying spray" to control brown rot in shipment.

Dr. Kenneth J. Kadow of the University of Illinois, Department of

Horticulture in an excellent report, given in the 1934 Transactions of the Illinois State Horticutlural Society has investigated the possibilities of zinc sulfate-lime spray, as it applies to disease control, effect upon growth, and control of spray injury.

Stating that further experiment was necessary, Dr. Kadow summarized his results, as found in his Illinois experiments:

"The experiments presented herein were initiated to facilitate an accurate evaluation of the possible effects of zinc sulfate used on the peach as a spray mixture ingredient. The results obtained may be summarized as follows:

1. Zinc sulfate-lime is, at best, a very weak fungicide and should not be applied specifically for the control of peach scab or brown rot. Sulfur is much more effective in this role and no more expensive.

2. Zinc sulfate-lime gives no measurable control of *Phytomonas pruni,* the bacterial spot disease, under field conditions, and in laboratory tests it is actually inferior to lime alone.

3. Zinc sulfate increased the growth of peach seedlings in sand culture, but had no measurable effect on pigment formation. Zinc is always present in the ash of healthy peach tissue, as shown by studies in California and Illinois, although its function is not understood.

4. Under Illinois field conditions, zinc sulfate-lime does not cause injury when applied as a spray to peach trees. By actual measurements it is found to slightly decrease leaf area. It has no measurable effect on pigment formation.

5. Lead arsenate-lime sprays materially reduce both pigment formation and leaf area when applied to the peach. Other forms of injury are also common from this mixture.

6. Zinc sulfate-lime should not be used as a spray on peaches for its fungicidal, bactericidal, or stimulating powers.

7. When zinc sulfate is added to a lead arsenate-lime spray it practically eliminates the injury so common from this mixture. It prevents the rapid carbonation of lime and probably precipitates an insoluble zinc arsenate whenever arsenic acid is formed. In a study of carbonation, it was found that the chief source of the carbon dioxide which caused the carbonation of the lime in lead arsenate-lime spray mixtures was from the air. This may not always be the case.

8. Lime carbonates in a very few days and once it is carbonated it is responsible for large increases of water soluble arsenic from lead arsenate-lime spray mixtures, whenever enough moisture is present to allow the reactions to take place.

9. Lead arsenate-lime sprays should *never be applied* to the peach under Illinois conditions without the addition of zinc sulfate to prevent subsequent spray injury, which sometimes is a very serious matter.

10. The recommendation of 6 pounds zinc sulfate, 6 pounds hydrated lime, 3 pounds of lead arsenate, and 100 gallons of water, is based on the results of three years of experimentation and will be recommended in the future to Illinois peach growers."

Zinc sulfate-lime spray has not proven satisfactory for use on apple trees, as it russets some varieties and also seems to reduce the efficiency of the apple sprays.

HAVE YOU READ THE ADVERTISEMENTS?

A FEW BULLETINS

The following bulletins may be of interest. A post card addressed to the particular Experiment Station will bring you are bulletin desired.

"Functional Diseases of the Apple in Storage"—Iowa Bulletin 329, April, 1935. Iowa Agr. Exp. Sta., Ames, Iowa.

"Physiological Behavior of Grimes Golden Apples in Storage"—Iowa Research Bulletin 182 (Technical), April, 1935, Iowa Agr. Exp. Sta., Ames, Iowa.

"Raspberries and Blackberries"—Indiana Ext. Bulletin 191, April, 1933. Indiana Agr. Ext. Service, La Fayette, Indiana.

"Grape Growing in Ohio"—Ohio Extension Bulletin 135, October, 1932. Ohio Agr. Ext. Service, Columbus, Ohio.

"Pruning the Apple Tree"—N. C. Ext. Circular 205, February, 1935. N. C. Agri. Extension Service, Raleigh, N. C.

"Studies of the Response of Latham Raspberry to Pruning Treatment"—Minnesota Technical Bulletin 100. 1934. Minn. Agr. Exp. Sta., St. Paul, Minn.

"Raspberry Growing in New York"—N. Y. Circular 153. 1934. N. Y. Agr. Exp. Sta., Geneva, N. Y.

"Experiments on Thinning Peaches"—Ohio Bulletin 541. 1934. Ohio Agr. Exp. Sta., Wooster, Ohio.

"Causes of Cull Apples"—Missouri Bulletin 343. 1935. Missouri Agr. Exp. Sta., Columbia, Mo.

REPLANTING IN NEW YORK

With estimated loss of 16½% of bearing apple trees in commercial orchards, and 26% of bearing trees injured, in New York State during the winter of 1933-34, the growers are thinking of replanting McIntosh, Cortland, Northern Spy and Green and even considerable Baldwin acreage. The Baldwin suffered a 27% loss of bearing trees, but some growers like this variety well enough to try it again. Rhode Island Greening had over 12% kill, while McIntosh suffered loss of only 1.7% of bearing trees in commercial orchards.

COMPETITION

In 1899, apples were being used at the rate of 112 pounds per person. During 1930-34 the average was 58 pounds per person. During the same years, oranges increased from 19 to 31 pounds per person, grapefruit increased from 0 to 9 pounds; peaches from 10 to 20 pounds; pears from 4 to 9 pounds and grapes from 17 to 32 pounds.

COSTS

In a discussion of a possible large crop for 1935, the Ohio State Horticultural Society News-Letter of April 30, states that Ohio growers are well fixed to handle low-priced apples on nearby markets. The point is made that a Washington State survey reports that the growers' only hope out there, is to produce at least 500 boxes of high-grade commercial apples of preferred varieties per acre. Their costs show slightly under 70c per bushel on a 1000 box per acre yield; 90c per bushel on a 500 box per acre yield, and $1.18 per bushel where only 300 boxes were produced per acre.

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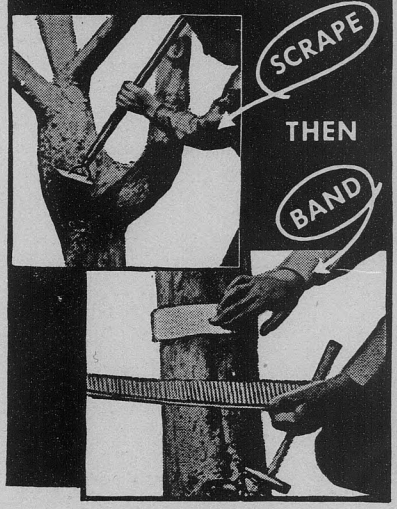

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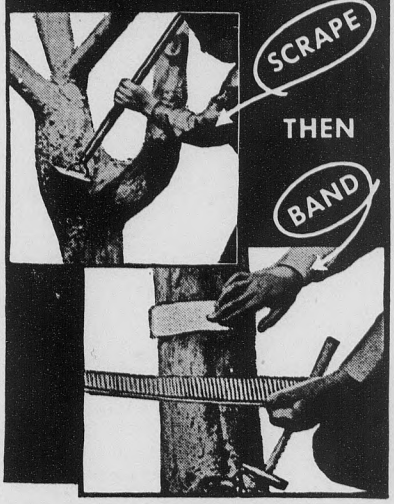

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